State of Kansas
Joan Finney, *Governor*

Reply To: (913) 296-1672/ FAX (913) 296-1686
Bureau of Environmental Remediation
Forbes Field, Building 740
Topeka, Kansas 66620-0001

Department of Health and Environment
Robert C. Harder, *Secretary*

January 28, 1994

Dr. Peter Culver, P.E.
U. S. Environmental Protection Agency
Region VII, Superfund Branch
726 Minnesota Avenue
Kansas City, Kansas 66101

ARCO Petroleum
KSD980632194
1 5

1-28-94

Dear Dr. Culver:

The Kansas Department of Health and Environment, Bureau of Environmental Remediation (KDHE/BER) is pleased to submit the revised Site Inspection Prioritization (SIP) report for the ARCO Petroleum Products Company in Kansas City, Kansas, EPA ID# KSD980632194. The revised report contains the EPA's recommended revisions to the Prescore package. In addition, KDHE has deleted the Pathway Assessment section of the report per our January 11, 1994 discussion.

Please refer to the original draft submitted in November, 1993 when referencing the appendix. Please call if you have questions or comments.

Sincerely,

William Kierl, Unit Chief
Environmental Geologist
Remedial Section/Pre-Remedial Unit
Bureau of Environmental Remediation

Enclosures

State of Kansas
Joan Finney, *Governor*

Reply To: (913) 296-1672/ FAX (913) 296-1686
Bureau of Environmental Remediation
Forbes Field, Building 740
Topeka, Kansas 66620-0001

Department of Health and Environment
Robert C. Harder, *Secretary*

November 22, 1993

Dr. Peter Culver, P. E.
U. S. Environmental Protection Agency
Region VII, Superfund Branch
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Dr. Culver:

The Kansas Department of Health and Environment, Bureau of Environmental Remediation (KDHE/BER) is pleased to submit the Site Inspection Prioritization (SIP) report for the ARCO Petroleum Products Company in Kansas City, Kansas, EPA ID #KSD980632194. This report was written to summarize investigative and remedial activities under the direction of the KDHE/BER at this site.

The report concentrates on activities that have occurred on site since the completion of the Preliminary Assessment and Site Investigation conducted by the KDHE/BER in 1986. We hope this report meets your approval, and encourage any comments and/or suggestions you may have regarding the report format and recommendations.

Sincerely,

Rick L. Bean, Chief
Remedial Section
Bureau of Environmental Remediation

Enclosure

C: Larry Knoche-->Bill Kierl-->Shannon Rothchild-->file

SITE INSPECTION PRIORITIZATION

ARCO PETROLEUM PRODUCTS COMPANY
KANSAS CITY, KANSAS

EPA Identification Number
KSD980632194

Kansas Department of Health and Environment
Bureau of Environmental Remediation
Pre-Remedial Unit/Remedial Section
Forbes Field, Building 740
Topeka, Kansas 66620

November, 1993

SITE INSPECTION PRIORITIZATION
ARCO PETROLEUM PRODUCTS COMPANY
KANSAS CITY, KANSAS
EPA Identification Number
KSD980632194

Remedial Project Manager:
Rachel Miller, (913) 296-1676

RCRA Project Manager:
Steve Broslavick, (913) 296-1609

SIP Report Prepared By:
Shannon L. Rothchild, (913) 296-1936

SITE INSPECTION PRIORITIZATION
ARCO PETROLEUM PRODUCTS COMPANY
KANSAS CITY, KANSAS

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INTRODUCTION

The Kansas Department of Health and Environment (KDHE) under the auspices of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA) conducted a Site Inspection Prioritization (SIP) at the Arco Petroleum Products Company Site (ID# KSD980632194). All SIPs are conducted as part of a cooperative agreement with the U.S. Environmental Protection Agency (EPA), Region VII, for the Fiscal Year 1994.

SARA required that EPA revise the Hazard Ranking System (HRS), the primary mechanism used to list sites on the National Priorities List (NPL) The revised HRS guidance was published in December, 1990. During the period of transition to the revised HRS, sites were evaluated under the original HRS. EPA felt it would be preferable to make final site disposition decisions based on the revised HRS.

The KDHE, Bureau of Environmental Remediation (BER), has agreed to complete SIPs on specific sites to gather additional information necessary to update the sites utilizing the revised HRS. The purpose of this report is to provide updated information and a revised HRS for the Arco Petroleum Products Company (ID# KSD980632194) site.

SITE LOCATION

Sinclair Marketing, Inc., of Salt Lake City, Utah operated a refinery from 1917 through 1946 on approximately 150 acres within Wyandotte, County in Kansas City, Kansas. The Geographic coordinates of the site are 39° 05' 00.0" N latitude and 94° 40' 00.0" W longitude (Figure 1). The site is bordered on the north and northeast by the Kansas River and Turner Drive. Woodland Avenue and 34th Street border the area on the east and west respectively. South and southwest of the area is bordered by Atchison Topeka and Santa Fe Railroads (ERM 1992).

Topographic Relief, Land Use, & Climate

The site is located within an industrialized area, with a residential area ¼ mile south of the site. Further development of the nearby area is restricted by the Kansas River flood plain, nearby industrial operations and railroad yards. The flood plain is broad and the topographic relief of the site is less than 0.14 feet per 100 feet towards the river. The site is protected from flooding by the presence of levees along the Kansas River. The climate of the area is characterized by hot summers, cold winters, moderate winds, and frequent changes in weather patterns from day to day. The average high temperature during the summer and winter is 88°F and 42°F respectively. The average yearly precipitation is 32 inches, with the majority occurring as rainfal during May through September (Zavesky and Boatright 1977).

Figure 1
Site Location Map

SOURCE: USGS 7.5' SHAWNEE QUAD., 1964, PHOTOREVISED 1975.

Site location map of Arco/Sinclair facility in Kansas City, Kansas. 26 October 1993.

Regional Geology

The geology underlying the site includes the Kansas River Valley alluvium and the Newman and Buck Creek terrace deposits of Pleistocene age. The alluvium has a maximum depth of 100 feet in Wyandotte County. Pennsylvania to Permian aged rocks underlie the alluvium. The lithology of the alluvium grades upward from locally derived flat limestone pebbles and boulders on the bedrock surface to brownish-gray arkosic sand and gravel in the lower alluvial area to fine sand, silt, and silty clay in the upper area. The soils beneath the site are tannish-brown sandy silt and silty sand (Zavesky and Boatright 1977).

Sand and gravel are the important water-bearing materials within the alluvium. Information obtained from past investigations at the site indicate the depth to ground water averages 25 feet and the average saturated thickness of the alluvium is 28 feet. Based on correlative fluctuations of ground water elevations and river stages, it appears river stage changes directly affect ground water elevations at the site, and ground water flow direction is occasionally reversed by changes in river stage (ERM 1992). The water table slopes slightly toward the Kansas River and ground water flows in a northeasterly direction toward the Kansas River at a hydraulic gradient of 0.00017 to 0.00022. The ground water flow rate is limited by the relatively low hydraulic gradients and is estimated at approximately 25 to 50 feet per year (SOC 1993).

SITE HISTORY AND OPERATION

The refinery was operated from 1917 through 1946 by Sinclair Marketing. During 1949 the refinery operations were discontinued and the processing equipment disconnected. Currently, three entities own the area and a fourth party lease a portion of the area (Figure 2). In 1976 Sinclair Oil Corporation (SOC) purchased 62 acres of the area and they operate a product storage terminal within this area. Product storage consists of gasoline and No. 1 and No. 2 fuel oils. Storage capacity ranges from 8,000 to 96,000 barrels and shipping of these products is continuous. An 8 inch underground pipeline, operated by Williams Pipe Line Company, is located at the north end of the SOC property. A manifold system distributing products from this pipeline is located on the east side of the Atlantic Richfield Company (ARCO) property. In 1974 Dymon, Inc., of Kansas City, Kansas began leasing a building and a small parcel of land within the property owned by Sinclair (KDHE 1987). Dymon manufactures or blends chemicals including pesticides, herbicides, solvents, and cleaning compounds that are stored on concrete floors inside their building. The Kansas Department of Health and Environment (KDHE) has delineated Dymon a small quantity generator of hazardous waste according to K.S.A. 65-3430 et seq. and K.A.R. 28-31-1 et seq., incorporating by reference 40 CFR Part 261, Subpart D. (KDHE 1989a, see Appendix A).

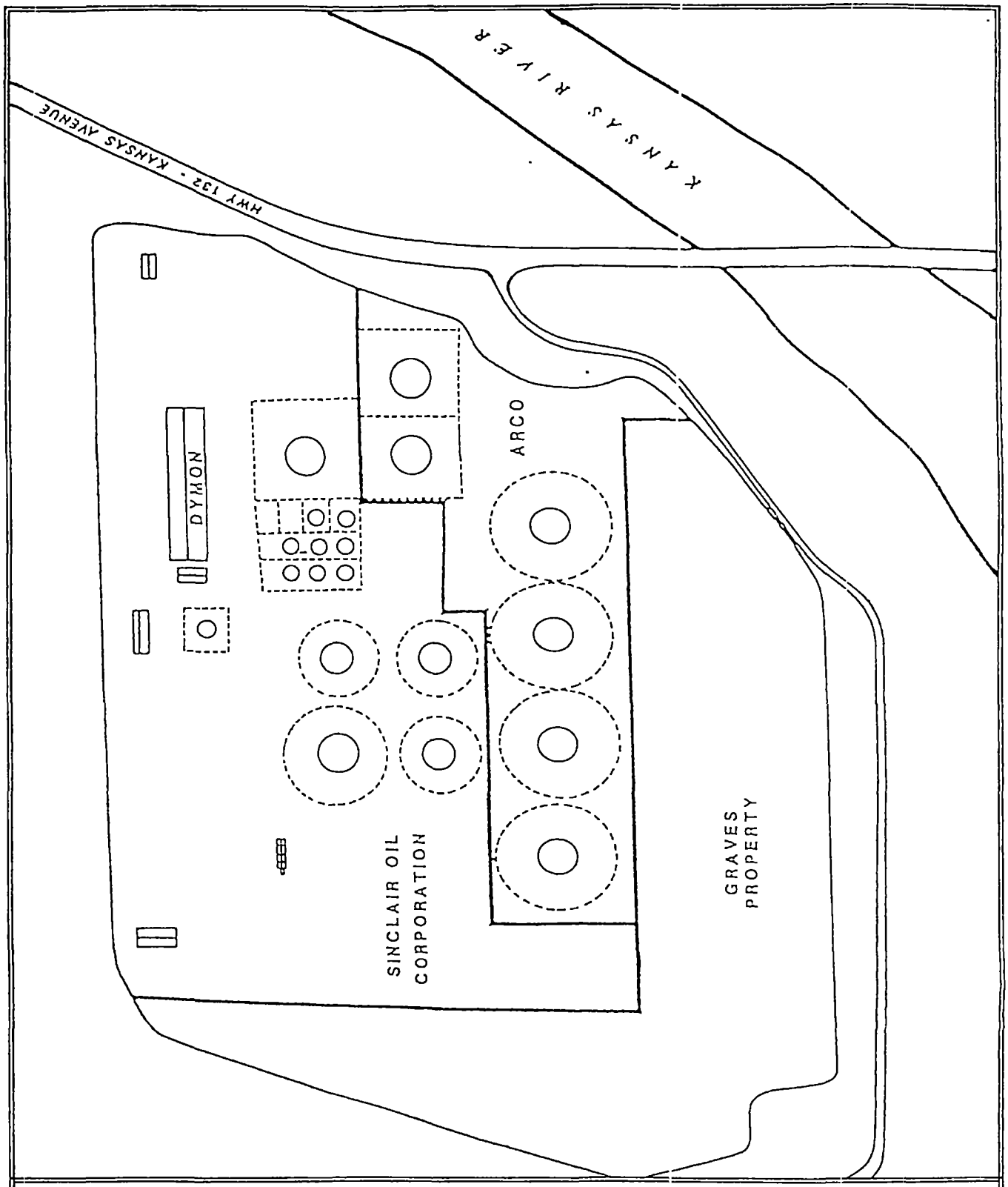

Figure 2
Property Division Map

SOURCE: PHASE II GROUND WATER ASSESSMENT AND BASELINE RISK ASSESSMENT, ERM-SOUTHWEST, 1992.

Division of property at Arco/Sinclair facility in Kansas City, Kansas. 26 October 1993.

Atlantic Richfield Company, Los Angeles, California owns approximately 36 acres of the original refinery property. ARCO also operates a petroleum product storage facility consisting of six tanks with a total storage capacity of 96,000 barrels. The remaining 52 acres is owned by the Graves family and is currently undeveloped.

During the 1930's an oil/water separation retention basin was installed and during the 1960's a septic tank was installed by Sinclair in the southeastern part of the former refinery. This basin received runoff from the refinery product loading areas, the ARCO storage facility, the SOC products terminal, the Dymon, Inc. facility (which included pesticies and oil waste), and storm water. Sludge that collected in the separator basin has been dredged twice in the last 20 years: December 1975 and July 1986. When the basin became full of water it was pumped out directly into a ditch which flowed into an open municipal storm drain, which eventually discharged into the Kansas River. The septic tank collected waste from SOC and Dymon, Inc and wastewater flowed from the tank to the retention basin. All lines leading to and from the separator basin were filled with concrete in 1989. The septic tank and retention basin are regulated units under the KDHE's RCRA program. In August 1993 KDHE accepted a plan for the closure of the oil/water separator and septic tank to be implemented during 1993 (SOC 1993). The drainage ditch area from the retention basin and an area where sludge from the retention basin was deposited are also regulated units under RCRA. The KDHE is currently reviewing a closure plan for these units. The above actions have transpired and a post-closure ground water monitoring plan will most likely be required in accordance with Consent Order Case No's. 89-E-17 and 89-E-18 (KDHE 1989 a & b, see Appendix A).

ARCO and SOC entered an Interim Agreement in August 1993 (see Appendix A) to conduct a corrective action study (CAS) under the KDHE's Bureau of Environmental Remediation (BER) (KDHE 1993). This CAS is to include a description of two corrective actions and a "no action" alternative for the hydrocarbon contamination of soil and groundwater at the site and then recommend a final corrective action.

PREVIOUS INVESTIGATIONS

During 1986 the KDHE conducted a Preliminary Assessment/Site Assessment (PA/SI) of ground water at the site. This consisted of drilling four borings and the construction of three ground water monitoring wells (MW 1-3) (Figure 3). This investigation indicated low concentrations of volatile organic constituents in groundwater (KDHE 1987).

In 1989 ARCO and SOC conducted investigations in the southwestern portion of the site. This included the construction and sampling of eight additional ground water monitoring wells (A 1-4 and ERM 1-4) (Figure 3), collection of soil samples for geotechnical

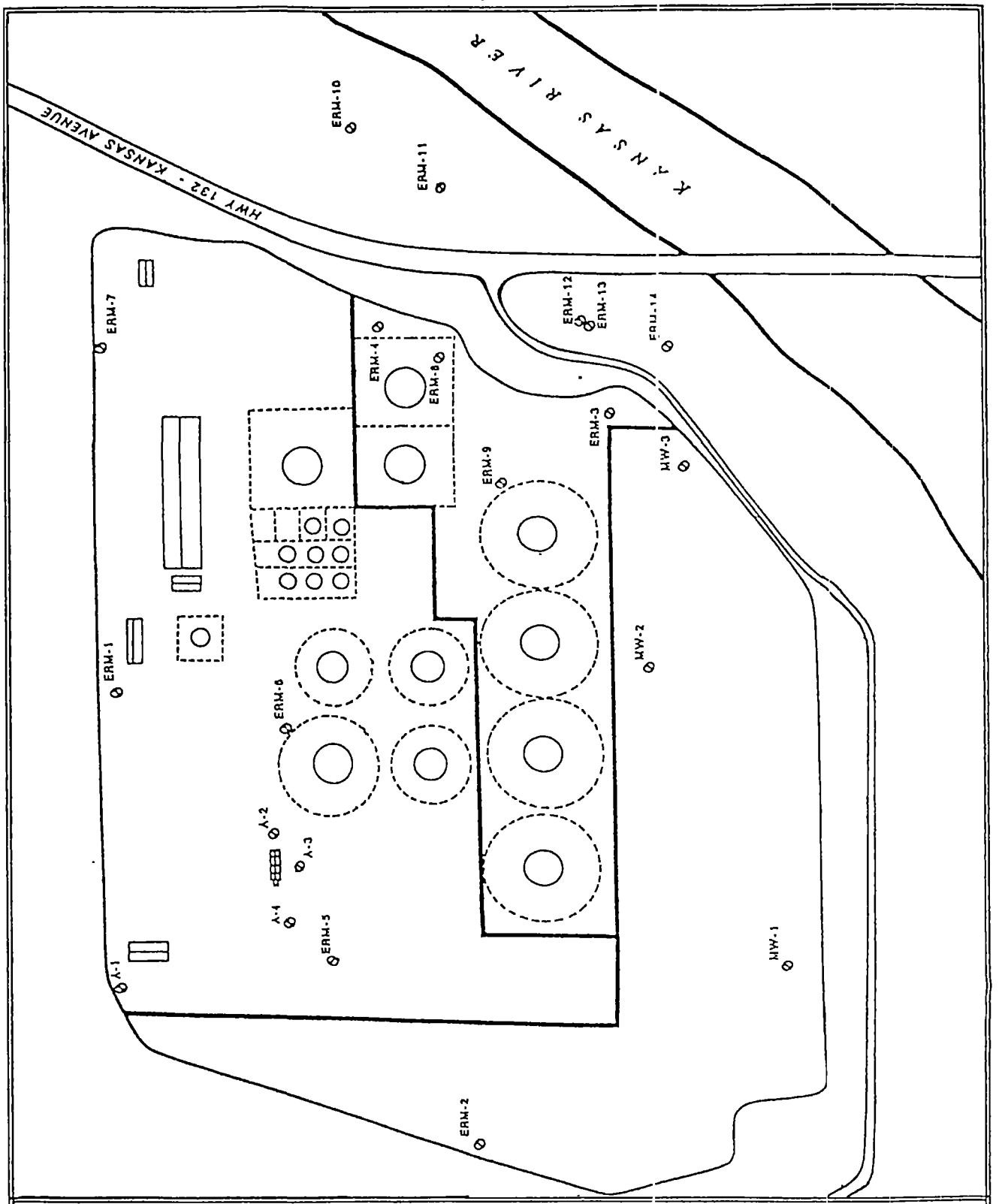

Figure 3
Monitoring Well Locations

SOURCE: PHASE II GROUND WATER ASSESSMENT AND BASELINE RISK ASSESSMENT, ERM-SOUTHWEST, 1992.

Location of monitoring wells at Arco/Sinclair facility in Kansas City, Kansas constructed by KDHE (MW 1-4), SOC (A 1-4) and ARCO (ERM 1-14). 26 October 1993.

analyses, and aquifer tests. The results of these investigations indicated elevated levels of hydrocarbon contamination in ground water (ERM 1989). Because of the results of these investigations KDHE requested that ARCO and SOC perform quarterly ground water monitoring. Quarterly sampling was conducted in July and October 1990 and January and April 1991. These samples revealed volatile organic constituents in 8 of the 11 monitoring wells (ERM 1991a).

In 1992 ARCO and SOC conducted a follow-up investigation to the 1989 investigation. Soil-gas samples, subsurface soil samples, six borings to ground water, ten newly constructed monitoring wells (ERM 5-14) (Figure 3), eleven existing monitoring wells, and two areas from the Kansas River were sampled during this investigation. This investigation confirmed soil and ground water have been contaminated at the site. Two areas of contamination are related to the former refinery site and the retention basin and a third area is related to a storage tank release. Two areas of light non-aqueous phase liquids (LNAPL's) were found on the water table. Volatile organic constituents were found in the deeper portion of the soil column. These areas were associated with areas of affected ground water. A plume of contaminated ground water was characterized under the site and extends hydraulically downgradient (northeasterly) toward the Kansas River. Surface water samples contained no detectable concentrations of contaminants (ERM 1992).

During the PA/SI in 1986 the KDHE sampled the storm water sewers, the retention basin, discharge from the basin, and the ditch which carries discharge from the basin. The results of this sampling indicated the presence of volatile organic compounds and low concentrations of pesticides and herbicides (KDHE 1987).

In 1987 Dymon, Inc. collected and analyzed sludge from the retention basin. Analysis revealed the presence of volatile organic compounds, pesticides, herbicides and several heavy metals. During 1987 SOC collected and analyzed sludge from the sewer system and septic tank. Analysis showed the presence of volatile organic compounds, and trace amounts of pesticides and herbicides (ERM 1991b).

In 1989, under RCRA authority SOC undertook a fourth investigation of the retention basin. This included a soil-gas survey and sub-surface soil sampling. Volatile organic compounds, chlorinated herbicides, pesticides, and the heavy metals barium, cadmium, chromium, and lead were detected (TriHydro 1989). A fifth investigation by SOC occurred in 1991. Liquid and sludge samples were obtained from the oil/water separator and sub-surface soil samples were taken. Results from this sampling indicated the presence of volatile organic compounds in both the liquid and sludge within the oil/water separator. However, no pesticides or herbicides were detected. Results of the soil samples indicated the presence of pesticides, volatile organic compounds and heavy metals (SOC 1993).

SUMMARY AND RECOMMENDATIONS

Investigations completed by ARCO, SOC, and DYMON, Inc. have revealed ground water and soil contamination on this site. There are no known uses of ground water for drinking within target distances. Currently the KDHE/BER has an Interim Agreement with ARCO and SOC to conduct a CAS and determine a corrective action for the hydrocarbon and heavy metal contamination of soil and ground water at the site. The KDHE's RCRA program is overseeing the closure of four regulated units at the site. Therefore, the KDHE recommends to the U.S. EPA that the Arco/Sinclair storage facility be a NFRAP site under CERCLA/SARA. It is recommended that KDHE continue to monitor all remedial activities at this site.

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Kansas Department of Health and Environment, 1989b, Consent Order, Case No. 89-E-18.

Kansas Department of Health and Environment-Bureau of Environmental Remediation, 1993, Interim Agreement to Conduct a Corrective Action Study (CAS) at the former Sinclair Refinery in Kansas City, Kansas.

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Sinclair Oil Company, 1993, Partial closure Plan for Oil/Water Separator and Septic Tank at Sinclair Oil Corporation Product Terminal at Kansas City, Kansas.

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TriHydro Corporation, 1989, Retention Basin Area Assessment Former Refinery Site, Kansas City, Kansas.

Zavesky, L. D. and W. C. Boatright, 1977, Soil Survey of Leavenworth and Wyandotte Counties, Kansas, United States Department of Agriculture, Soil Conservation Service.

APPENDIX

APPENDIX A

BEFORE THE KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

In the Matter of the Violation by
Dymon, Inc., of Provisions
of K.S.A. 65-3430 et seq. Case No. 89-E-17

ORDER

TO: Mr. Edward S. Rose, President
Dymon, Inc.
3401 Kansas Avenue
Kansas City, Kansas 66106

Stanley C. Grant, Ph.D., Secretary of the Kansas Department of Health and Environment (KDHE), having before him the contents of the administrative file, makes the following:

Findings of Fact

1. Dymon, Inc. (Dymon), operates a facility to mix, package and distribute various commercial and industrial products located at 3401 Kansas Avenue on property owned by Sinclair Oil Corporation (Sinclair.) Dymon has leased the building from which it operates since 1974. Dymon products consist of or contain detergents, bleaches, emulsifiers, chlorinated organic solvents, non-chlorinated organic solvents and pesticides. Several of the pesticides packaged and distributed by Dymon and chemicals used by Dymon in its quality control laboratory are on the F and U lists of hazardous wastes contained in K.A.R. 28-31-3, incorporating by reference 40 CFR 261, Subpart D.

2. Representatives of KDHE conducted an inspection of the Dymon facility on May 7, 1987. The Dymon production process in use entailed mixing and blending various chemicals in reactor vessels. These vessels were then rinsed with water, kerosene, or

other solvents into a floor drain system which collected in a sump at the south end of the process area.

3. Laboratory analyses on samples collected on May 7, 1987, show the sludge from the sump at the south end of the process area was contaminated with methoxychlor and 2,4-D.

4. The sump at the south end of the Dymon process area drained through the storm sewer system piping and collected in an oil-water separator located on Sinclair property south of the Dymon facility. Samples collected from the piping and the oil-water separator showed endrin, lindane, 2,4-D and methoxychlor. Sludge samples collected from the storm sewer piping leading to the oil-water separator showed endrin concentrations above the EP-Toxicity level.

5. Dymon operates a quality control laboratory at the facility which generates waste chemicals, including methylene chloride and other F-listed solvents as defined by K.A.R. 28-31-3, incorporating by reference 40 CFR Part 261, Subpart D. Methylene chloride has a hazardous waste number of F002. Laboratory wastes were discharged to a septic tank which is owned and operated by Sinclair. Dymon notified KDHE that this practiced ceased on or before May 28, 1987. The septic tank is physically connected to the oil-water separator by a pipe which allows both waste steams to mix prior to discharge.

6. Sinclair, through its agents or employees, discharged liquid portions of the contents of the oil-water separator/septic tank into a drainage ditch on Sinclair property which flowed into a ditch on adjacent property to the south of the Sinclair property

and into the Kansas River. On May 7, 1987, KDHE ordered this practice stopped.

7. Laboratory analyses of samples collected on May 7, 1987 show such liquid discharge was contaminated with volatile organic compounds and pesticides contained on the F and U hazardous waste lists. Specific chemicals included in the discharge, and their hazardous waste numbers include: methylene chloride (F002), tetrachloroethylene (F002), toluene (F005), 1,1,1-trichloroethane (F002), methoxychlor (U247) and 2,4-D (U240).

8. Sinclair, through its agents or employees, removed sludge from the oil-water separator and deposited the sludge on the ground directly west of the oil-water separator. On May 7, 1987, KDHE ordered this practice stopped.

9. Laboratory analyses on samples collected on May 7, 1987, show that sludge deposited on the ground from the oil-water separator was contaminated with pesticides and volatile organic compounds contained on the F and U hazardous waste list. Specific chemicals, along with their hazardous waste numbers include methylene chloride (F002), tetrachloroethylene (F002), toluene (F005), 1,1,1-trichloroethane (F002) and methoxychlor (U247).

10. In regard to the F and U listed hazardous wastes disposed of into the oil-water separator and septic tank, Dymon failed to follow the procedures required for moving hazardous waste off-site as set out at K.A.R. 28-31-4.

11. On August 4, 1987, the Secretary commenced case no. 87-E-60 before the Kansas Department of Health and Environment, directed to Dymon.

a. In case no. 87-E-60, Dymon was ordered, "To evaluate, segregate and dispose of all non-returnable drums located in the parking lot at the south end of the plant within 60 days of receipt of this Order. This activity shall include: . . . b) carrying out proper disposal of both solid and hazardous wastes contained in the drums; c) cleaning up all residues in the parking lot from leaking drums and maintain the area in such a fashion as to eliminate contamination through future activities."

b. Dymon received the Order in case no. 87-E-60 on August 6, 1987.

c. Case no. 87-E-60 has become final.

d. More than 60 days have passed since receipt of the Order in case no. 87-E-60 and Dymon has failed to comply with the orders of the Secretary stated in paragraph 11.a. above. Dymon failed to dispose of 72,150 lbs. of bulk ignitable wastes and 44 drums of hazardous wastes referenced in paragraph 2.b. of administrative Order 87-E-60 until May 18th and 21st of 1988. In addition, 171 overpack drums of waste were not disposed of until September 9, 1988.

12. Dymon has stored greater than 1,000 kilograms of hazardous waste for greater than 90 days without having interim status to operate as a hazardous waste storage facility or having a hazardous waste storage facility permit.

Conclusions of Law

13. K.S.A. 1988 Supp. 65-3443(a) states:

> If the secretary finds that the generation, accumulation, management or disposal of a hazardous waste by any person is causing or threatens to cause pollution of the land, air or waters of the state or is or threatens to become a hazard to persons, property or public health or safety or that the provisions of this act or any rule and regulation adopted pursuant thereto have been otherwise violated, the secretary may order the person . . . to provide and implement such hazardous waste management procedures as will prevent or remove the pollution or hazard or take any other action deemed necessary.

a. Dymon has generated, managed and disposed of hazardous wastes;

b. Dymon is a person as defined at 65-3430(o);

c. Dymon has generated, managed and disposed of hazardous waste in a manner which has resulted in the pollution of the land and is causing or threatens to cause pollution of the waters of the state;

d. Dymon has generated, managed and disposed of hazardous waste in a manner which is and threatens to become a hazard to persons, property and the public health and safety;

e. Dymon has generated, managed and disposed of hazardous waste in a manner that violates provisions of K.S.A. 65-3430 et seq., and rules and regulations promulgated thereunder;

f. Therefore, the secretary may order Dymon to provide and implement such hazardous waste management procedures as will remove the pollution or hazard and to take any other

action deemed necessary.

14. K.S.A. 1988 Supp. 65-3453, states:

> The secretary shall have the power to: . . . (c) issue clean-up orders to persons responsible for the health or environmental hazard created by the hazardous waste . . . .

a. Dymon is a person as that term is defined at K.S.A. 65-1330(o);

b. Dymon has generated, managed and disposed of hazardous wastes, which are hazardous substances;

c. The hazardous substances generated, managed and disposed of by Dymon have created health and environmental hazards;

d. Dymon is the person responsible for the health and environmental hazard created by the hazardous substances pursuant to the following statutes:

1. For purposes of K.S.A. 65-3442, title to hazardous waste remains with Dymon because the hazardous waste was disposed of in ways other than in accordance with the provisions of K.S.A. 65-3430 et seq. Dymon is responsible for removal of the waste, restoration of the area in which the wastes were disposed and the disposal of the waste;

2. Dymon, as owner of the hazardous waste, is a person responsible for the discharge, abandonment and disposal of such hazardous waste and is therefore responsible for investigation and remediation costs pursuant to K.S.A. 65-3455, as amended.

e. The Secretary is therefore authorized to order Dymon

to investigate the health and environmental hazard created by the hazardous waste and to remediate the site.

15. For purposes of K.S.A. 1988 Supp. 65-3446, Dymon has violated the following provisions of K.S.A. 65-3441;

a. K.S.A. 65-3441(a)(1) for depositing hazardous waste in the oil-water separator and septic tank;

b. K.S.A. 65-3441(a)(2) for storing greater than 1000 kilograms of hazardous waste in drums without a permit;

c. K.S.A. 65-3441(a)(4) for storing, collecting and disposing of hazardous waste contrary to the requirements of K.A.R. 28-31-4, 28-31-5, and 28-31-8;

16. Administrative Order 87-E-60 imposed an administrative penalty of $5,000.00 per day for each day a violation of the conditions of the Order occurred. Dymon has been found to be in violation of the terms of Administrative Order 87-E-60. The Secretary concludes that $30,000 is an actual and substantial deterrent to the violations contained in paragraphs 15 and 16 of his Order. The setting of such penalty in the amount of $30,000 shall not be construed as a waiver by KDHE of imposing an administrative penalty in the amount of $5,000 per day for each day a violation of the conditions of administrative Order 80-E-60 occurs after the date of this Order.

Order

Pursuant to K.S.A. 1988 Supp 65-3443 and K.S.A. 65-3453, as

amended, Dymon is ordered to do as follows:

17. Submit a soil investigation and sampling program to determine the vertical and horizontal extent of soil contamination in and around the oil/water separator at the location of the sludge disposal and the ditches which received wastewater from the oil/water separator. The investigation plan shall include locations, number, depth and type of soil samples and analyses to be conducted. All samples and analyses shall be collected and analyzed in accordance with procedures contained in Appendices II and III of 40 CFR Part 261 and EPA publication S.W. 846, shall include proposed detection limits for all parameters, and shall be conducted by a laboratory certified for all parameters by KDHE. Said soil investigation plan shall include a timetable for all activities to be implemented and shall be submitted to KDHE within 45 days of receipt of this Order. Implementation of the soil investigation plan shall commence within 15 days of receipt of approval by KDHE and shall be completed within 180 days of receipt of approval by KDHE.

18. Submit a report summarizing the results of the soil investigation to KDHE within 210 days of receipt of approval of the investigation plan. Said report shall also include a remediation plan and time schedule for cleanup of all contaminated soil and sludge, and for cleanup and closure of the oil/water separator and adjacent septic tank. The cleanup plan shall include proposed methods of collection, storage, treatment and disposal. Implementation of the cleanup plan for the oil/water separator, the septic tank and the contaminated soil and sludge shall commence

within 45 days of receipt of approval of the plan from KDHE and shall be completed within 180 days of receipt of approval of the plan.

19. Submit a hydrogeologic investigation and groundwater monitoring plan for the area potentially affected by the discharges, designed to determine whether groundwater contamination has occurred. The investigation plan shall discuss the following:

a. Geologic and hydrogeologic characteristics in the vicinity of the oil/water separator;

b. Topographic, geomorphic or other features that might influence the groundwater flow system;

c. A groundwater piezometric map based on sea-level datum;

d. Groundwater flow directions;

e. Top-of-casing elevations or other appropriate reference elevations;

f. The design and installation of a monitoring well network including upgradient well(s) capable of yielding samples that are representative of background water quality and downgradient wells capable of detecting any hazardous waste or hazardous constituents that may migrate from the facility into groundwater. All new monitoring wells constructed to meet the terms of this Order shall be completed in accordance with the monitoring well design specifications attached as an appendix to this Order. The hydrogeologic investigation and groundwater monitoring plan shall be submitted to the Department for approval within 60 days of

receipt of this Order. Implementation of the hydrogeologic investigation and monitoring plan shall commence within 30 days of receipt of approval by KDHE and shall be completed within 90 days thereafter.

20. Conduct quarterly sampling and analyses of all monitoring wells comprising the new groundwater monitoring network as established within the hydrogeologic and groundwater investigation plan for the parameters of priority pollutant volatile organic compounds, base neutral extractable compounds, acid extractable compounds, pesticides, herbicides and heavy metals. This sampling shall commence within 15 days of installation of the monitoring wells and continue until notice by KDHE. Obtain static water level elevations and determine the Kansas River stage elevation prior to each sampling event. All samples are to be analyzed by a Kansas certified laboratory.

21. Establish a permanent reference point on the Kansas River or use an existing nearby reference point in order to determine river stage elevation. The location of the reference point shall be indicated on the map required by Paragraph 19.

22. Submit to KDHE a final report within 45 days of the conclusion of the first quarter of sampling as required in Paragraph 20. The report shall provide the following:

a. groundwater and surface water monitoring data which is to include analytical results, static water level elevations, top of casing elevations, and river stage elevation;

b. groundwater potentiometric map;

c. base map showing final monitoring well locations, and Kansas River permanent reference point location;

d. schematic drawing of each monitoring well; and

e. lithologic log for each monitoring well.

23. Submit a groundwater remediation plan to KDHE within 60 days following notification by KDHE. The remedial plan shall include an engineering design and implementation schedule to address the cleanup, monitoring, treatment and/or disposal of contaminated groundwater.

24. Dymon is further ordered to provide KDHE and its designated representatives reasonable access to Dymon properties as necessary to determine and verify and/or conduct independent investigations or other necessary actions and to provide KDHE, as requested, any and all information, data, and reports concerning operations, products, and process wastes, whether existing or prepared pursuant to this Order, except for any such information which would otherwise be exempt from disclosure pursuant to the attorney-client privilege.

25. All plans, reports and time schedules required by the terms of this Order are, upon approval by KDHE, made part of and incorporated into this Order. Any noncompliance with conditions contained in such approved plans, reports or time schedules shall be termed noncompliance with this Order.

26. In the event KDHE determines that the soil and groundwater investigations demonstrate no evidence of respective media contamination, the parts of this Order pertaining to the preparation and implementation of the remediatior plan concerning

such media contamination are hereby void and nullified.

27. The requirements of this Order represent KDHE's best professional judgment at this time and are based upon available information. If circumstances change, or if data indicates the threat of danger to public health, the environment, or a different threat or pollution than is contemplated herein, KDHE retains the right to modify all dates and requirements or add additional requirements to this Order as it deems necessary. Dymon retains the right to appeal such modifications or additional requirements.

28. As soon as Dymon knows or has reason to know of the occurrence of any event that may delay or prevent the timely performance of any requirements of this Order (including requirements contained in plans approved pursuant to the Order), Dymon shall promptly provide oral notification to KDHE. Within seven days after such oral notification, Dymon shall submit to KDHE a written description of the event which may delay or prevent performance, the expected duration of the delay or nature of the preventive performance, and actions which will be taken to mitigate any delay or failure to perform. Any event beyond the control of Dymon that delays or prevents performance of Dymon's obligations under this Consent Order constitutes a Force Majeure. Delays or failure to perform obligations caused by a Force Majeure shall not constitute violations of this Order.

29. Dymon is ordered to pay to KDHE an administrative penalty of $30,000.00 pursuant to K.S.A. 1988 Supp. 65-3446 and the terms of administrative Order 87-E-60. Such administrative penalty shall be submitted to the office of the Secretary of Health and

Environment, Forbes Field, Building 740, Topeka, Kansas 66620 within 30 days of the receipt of this order.

30. Failure on the part of Dymon to comply with any condition of this Order, or any plan submitted and approved pursuant to this order, shall constitute a violation of K.S.A. 65-3441 and will result in the issuance of administrative penalties of $5,000.00 per day per condition violated for each day the violation of such condition exists.

Appeal Rights

If Dymon is aggrieved by this Order, it may within 30 days of service of the Order request a hearing on the Order. The request for hearing shall be made in writing to Stanley C. Grant, Ph.D., Secretary, Department of Health and Environment, Forbes Field, Building 740, Topeka, Kansas 66620.

IT IS BY THE SECRETARY OF HEALTH AND ENVIRONMENT SO ORDERED ON THE 1st DAY OF June, 1989.

Stanley C. Grant, Ph.D.
Secretary, Department of Health
and Environment

Certificate of Mailing

This is to certify that on the 2nd day of June, 1989, a true and correct copy of the above and foregoing Order was deposited in the U.S. mail, postage prepaid, certified mail, properly addressed to:

Mr. Edward S. Rose, President
Dymon, Inc.
3401 Kansas Avenue
Kansas City, Ks 66106

Mr. Edward S. Rose
Resident Agent for Dymon, Inc.
9524 Catalina
Overland Park, Kansas

Dorothy Fowler
Staff Person

Certified Mail Nos. P 915 387 755 Edward S. Rose, President

P 915 387 756 Edward S. Rose, Resident Agent

MONITORING WELL DESIGN SPECIFICATIONS

A) Well Materials

The well shall be constructed of materials which are not subject to adsorption, absorption, leaching or direct attack by the suspected or known contaminants in the groundwater environment. No glue, solvents, or lubricants shall be used to construct the well. The casing shall be constructed with threaded flush joint and be at least 2 inches inside diameter. The well screen slot sizes shall be determined by a study of sieve-analysis data from samples representing the water bearing formation. The well screen shall be factory slotted. The well filter pack shall be designed so that 90 per cent of the filter pack is retained after development. The length of well screen shall be 10 feet or less to insure discrete sampling horizons.

B) Well Filter Pack and Annular Seals

The well filter pack shall be constructed of clean, inert, well rounded, organic-free material whose uniform coefficient is 2.5 or less. The filter pack shall be implaced a minimum of 1 1/2 inches on all sides of and shall extend no more than 2 feet above the well screen.

A minimum of 2 feet of certified sodium bentonite pellets shall be placed on top of the well filter pack. The pellets are to be placed so that a complete seal around the well casing may be obtained. The pellets shall be allowed to hydrate a minimum of 8 hours before further work is performed in the well.

The annular space from the top of the bentonite seal to within 1 foot beneath the frost line shall be filled with an expansive cement grout. The grout shall be placed with a tremie from the bottom of the annular area to be grouted.

The remainder of the bore hole shall be filled with a continuous pour of concrete to create a seamless concrete cap and well apron. A locking protective well casing shall be imbedded in the concrete to protect the well stick-up. The concrete apron shall be a minimum of 4 inches in thickness and 3 feet in radius. It shall be sloped to promote drainage away from the well.

Protective guards adequate to protect the well from site traffic shall be installed around the wells. A permanent survey marker shall be installed on the well for use in water level measurements. The marker shall be surveyed to within 0.1 foot horizontal and 0.01 vertical in reference to a permanent benchmark.

C. Well Development

Pumping systems which are air driven shall allow only the water which is to be expelled from the well to come into contact with the air used to operate the system. Under no circumstances will any system allow operational air to come in contact with the formation. Only formation water is to be used for development of the wells. Water and solids produced from the development of the wells shall be retained and properly disposed of.

All wells are to be developed before use as monitoring wells. Development may be accomplished by surging or vigorous pumping. Pumping systems shall be equipped with a check valve which will prevent backflow from the system into the well.

BEFORE THE KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

In the Matter of the Violation by Sinclair Oil Corporation, Inc. of Provisions of K.S.A. 65-161 et seq., K.S.A. 65-3401 et seq., and K.S.A. 65-3430 et seq.

Case No. 89-E-18

CONSENT ORDER

TO: James S. Loving, General Manager
Sinclair Oil Corporation, Inc.
550 E. South Temple
P.O. Box 30825
Salt Lake City, Utah 84130-0825

Stanley C. Grant, Ph.D., Secretary of the Kansas Department of Health and Environment (KDHE), having before him the contents of the administrative file, makes the following findings:

Findings of Fact and Conclusion of Law

1. Pursuant to K.S.A. 65-3431, the Secretary of Health and Environment has adopted Article 31 of Chapter 28 of the Kansas Administrative Rules and Regulations (hereinafter K.A.R. 28-31-1 et seq.).

2. Sinclair Oil Corporation, Inc. (hereinafter referred to as Sinclair), a Wyoming Corporation licensed to do business in this state, has The Corporation Company, Inc., 534 South Kansas Avenue, Topeka, Kansas 66603, as its resident agent. Sinclair owns and operates a petroleum products terminal at 3400 Kansas Avenue, Kansas City, Kansas (the Terminal). The Terminal is located on the site of the former Sinclair Refinery, which, prior to July 1, 1976,

was owned and operated by Pasco Marketing, Inc. Prior to that date, Sinclair's predecessor in interest had leased a building on the property to Dymon Chemical, Inc. (hereinafter referred to as Dymon), for the manufacture of pesticides and other products.

3. Dymon Corporation operates a facility to mix, package and distribute various commercial and industrial products located at 3401 Kansas Avenue on the Sinclair property. Dymon has leased the building from which it operates from Sinclair since 1974. Dymon products consist of or contain detergents, bleaches, emulsifiers, chlorinated organic solvents, non-chlorinated organic solvents and pesticides. Several of the pesticides packaged and distributed by Dymon are on the U and F lists of hazardous wastes contained in K.A.R. 28-31-3, incorporating by reference 40 CFR, Part 261, Subpart D.

4. In October 1986, representatives of KDHE conducted an investigation into possible surface and groundwater contamination at the Terminal. During the course of the investigation, a discharge from a former oil-water separator, owned and operated by Sinclair as a retention basin, was noted. The retention basin is located approximately one-half mile south of the Dymon facility. Samples of the discharge were collected and analyzed for volatile organic compounds, heavy metals, and pesticides. The discharge was again sampled by KDHE representatives in January of 1987. The retention basin received wastewaters from the following sources: Dymon Corporation's sanitary facility and process lines, Sinclair's sanitary facilities and surface water runoff. The laboratory results indicated extensive contamination of the discharge with

volatile organic compounds and pesticides. Such volatile organic compounds and pesticides are defined as sewage by K.S.A. 1986 Supp. 65-164.

5. On May 7, 1987, representatives of KDHE conducted an inspection to determine whether Dymon and Sinclair were in compliance with Kansas' solid waste, hazardous waste, and water pollution control statutes and administrative regulations. That inspection revealed that the wastewater contained in the retention basin was discharged by Sinclair employees as needed when the tank reached capacity. The discharge flows in a drainage ditch on Sinclair property in a southerly direction whereupon it intercepts an adjacent ditch on property to the south of Sinclair which then discharges into the Kansas River. A review of the administrative file for Sinclair reveals that Sinclair has not been issued an NPDES discharge permit for the retention basin discharge. The May 7, 1987 inspection also revealed that employees of Sinclair had, on at least one occasion, removed sludge from the retention basin and deposited said sludge on the ground directly west of the retention basin. Laboratory analysis of samples collected by Department representatives on May 7, reveals the sludge to be contaminated with volatile organic compounds and pesticides. This sludge meets the definition of a hazardous waste as contained in K.A.R. 28-31-3, incorporating by reference 40 CFR, Part 261, Subpart D.

6. Pursuant to K.S.A. 1988 Supp. 65-164, the Secretary finds that as a result of the generation, accumulation, management or discharge of pollutants by Dymon and Sinclair as described above,

the waters of the state have been or are being polluted in a manner prejudicial to the health of the inhabitants of the state.

7. The Secretary finds that Sinclair has failed to file an application for a permit to discharge sewage into the waters of the state as required by K.S.A. 65-165.

8. Pursuant to K.S.A. 1988 Supp. 65-3443, the Secretary finds that the generation, accumulation, management and disposal of hazardous wastes by Dymon, Inc. and Sinclair, Inc. is or threatens to cause pollution of the land and waters of the state and is or threatens to become a hazard to persons, property, or public health or safety, and that the provisions of the Hazardous Waste Act, K.S.A. 65-3430 et seq., and rules and regulations adopted pursuant thereto have been otherwise violated.

9. Pursuant to K.S.A. 1988 Supp. 65-164, K.S.A. 65-3441 and K.S.A. 1988 Supp. 65-3443, the Secretary further concludes that these practices by Sinclair Oil Corporation, Inc. and Dymon, Inc. are causing pollution of the land and waters of the state and represent a hazard to persons, property, public health and safety.

10. Sinclair neither admits to nor agrees with the foregoing Findings of Fact and Conclusions of Law.

11. On or about November 27, 1988, Sinclair submitted a retention basin area assessment plan to KDHE for review. In a letter dated December 19,1988, KDHE approved of the plan with certain changes to be made.

12. Sinclair and Dymon, Inc. have attempted to negotiate a Participation Agreement but have not been successful. Sinclair has elected to proceed with the assessment plan and execution of this

Consent Order without such an agreement subject to the reservation of rights contained herein.

Order

Pursuant to K.S.A. 1988 Supp. 65-3443 and K.S.A. 1988 Supp. 65-164, Sinclair Oil Corporation, Inc. is hereby ordered to and, in compromise and settlement of this matter, acknowledges and agrees to do as follows:

13. Submit a soil investigation and sampling program to determine the vertical and horizontal extent of soil contamination in and around the retention basin, at the location of the sludge disposal and the ditches which received wastewater from the retention basin. The investigation plan shall include locations, number, depth and type of soil samples and analyses to be conducted. All samples and analyses shall be collected and analyzed in accordance with procedures contained in Appendices II and III of 40 CFR Part 261 and EPA publication S.W. 846, shall include proposed detection limits for all parameters, and shall be conducted by a laboratory certified for all parameters by KDHE. Said soil investigation plan shall include a timetable for all activities to be implemented and shall be submitted to KDHE for review no later than November 30, 1988. Implementation of the soil investigation plan shall commence within 15 days of receipt of approval by KDHE and shall be completed within 180 days of receipt of approval by KDHE.

14. Submit a report summarizing the results of the soil investigation to KDHE within 210 days of receipt of approval of the investigation plan. Said report shall also include a remediation

plan and time schedule for cleanup of the contaminated soil and sludge, and for cleanup and closure of the retention basin and adjacent septic tank as shown on the map attached hereto as Appendix "B". It is noted and agreed to by the parties that the shaded area of Appendix "B" represents an estimate of the areas in which the contamination being addressed by this Order lies, and it is specifically noted that, especially in regard to the shaded area denoted as the "ditch", the area of contamination cannot be delineated until a complete soil investigation has been conducted. The soil cleanup portion of the report shall be based on the results of the soil investigation. The soil investigation and cleanup plan shall address soil contamination in the ditch which has migrated off of Sinclair property. The cleanup plan shall include proposed methods of collection, storage, treatment and disposal. Implementation of the cleanup plan for the retention basin, the septic tank and the contaminated soil and sludge shall commence within 45 days of receipt of approval of the plan from KDHE and shall be completed within 180 days of receipt of approval of the plan.

15. Submit a hydrogeologic investigation and groundwater monitoring plan for the area potentially affected by the discharges, designed to determine whether groundwater contamination has occurred. The investigation plan shall discuss the following:

a. Geologic and hydrogeologic characteristics in the vicinity of the retention basin;

b. Topographic, geomorphic or other features that might influence the groundwater flow system;

c. A groundwater piezometric map based on sea-level datum;

d. Groundwater flow directions;

e. Top-of-casing elevations or other appropriate reference elevations;

f. The design and installation of a monitoring well network including upgradient well(s) capable of yielding samples that are representative of background water quality and downgradient wells capable of detecting any hazardous waste or hazardous constituents that may migrate from the facility into groundwater. All new monitoring wells constructed to meet the terms of this Order shall be completed in accordance with the monitoring well design specifications attached as Appendix "A" of this Order. The hydrogeologic investigation and groundwater monitoring plan shall be submitted to the Department for approval no later than April 15, 1989. Implementation of the hydrogeologic investigation and monitoring plan shall commence within 30 days of receipt of approval by KDHE and shall be completed within 90 days thereafter.

16. Conduct quarterly sampling and analyses of all monitoring wells comprising the new groundwater monitoring network as established within the hydrogeologic and groundwater investigation plan for the parameters of priority pollutant volatile organic compounds, base neutral extractable compounds, acid extractable compounds, pesticides, herbicides and heavy metals. This sampling shall commence within 15 days of installation of the monitoring

wells and continue until notice by KDHE. Sinclair will obtain static water level elevations and determine the Kansas River stage elevation prior to each sampling event. All samples are to be analyzed by a Kansas certified laboratory. After completion of four quarters of sampling, the parties agree to reevaluate the parameters to be analyzed.

17. Establish a permanent reference point on the Kansas River or use an existing nearby reference point in order to determine river stage elevation. The location of the reference point shall be indicated on the map required by Paragraph 15.

18. Submit to KDHE a final report within 45 days of the conclusion of the second quarter of quarterly sampling as required in Paragraph 16. The report shall provide the following:

a. groundwater and surface water monitoring data which is to include analytical results, static water level elevations, top of casing elevations, and river stage elevation;

b. groundwater potentiometric map;

c. base map showing final monitoring well locations, and Kansas River permanent reference point location;

d. schematic drawing of each monitoring well; and

e. lithologic log for each monitoring well.

19. Sinclair agrees to provide KDHE and its designated representatives reasonable access to Sinclair properties as necessary to determine and verify and/or corduct independent investigations or other necessary actions and to provide KDHE, as requested, any and all information, data, and reports concerning

operations, products, and process wastes, whether existing or prepared pursuant to this Order, except for any such information which would otherwise be exempt from disclosure pursuant to attorney-client privilege, attorney work product or the interpretations and opinions of technical consultants which have been submitted to Sinclair for the purpose of rendering legal advice.

20. All plans, reports and time schedules required by the terms of this Order are, upon approval by KDHE, made part of and incorporated into this Order. Any noncompliance with conditions contained in such approved plans, reports or time schedules shall be termed noncompliance with this Order.

21. The requirements of this Order represent KDHE's best professional judgment at this time and are based upon available information. If data indicates the threat of danger to public health or the environment, or a different threat or pollution than is contemplated in paragraphs 2, 3, 4, and 5 of this Consent Order, KDHE retains the right to modify all dates and requirements or add additional requirements to this Order as it deems necessary. Sinclair retains the right to appeal such modifications or additional requirements. This Consent Order may be amended by mutual agreement of KDHE and Sinclair. Such amendment shall be in writing and shall be effective the date the amendment is approved by KDHE and Sinclair.

22. By entering into this Consent Order, KDHE does not waive other applicable statutory remedies, and, in the event KDHE invokes other statutory remedies, Sinclair does not waive any right to

appeal therefrom. KDHE does waive any statutory penalties it may have imposed for violations of state or federal statutes or rules and regulations occurring prior to the date of this agreement, over which KDHE has jurisdiction and violation of which KDHE is or should have been aware.

23. This Consent Order shall apply to and be binding upon KDHE and Sinclair and their respective officers, directors, employees, agents, successors and assigns.

24. As soon as Sinclair knows or has reason to know of the occurrence of any event that may delay or prevent the timely performance of any requirements of this Consent Order (including requirements contained in plans approved pursuant to the Consent Order), Sinclair shall promptly provide oral notification to KDHE. Within seven days after such oral notification, Sinclair shall submit to KDHE a written description of the event which may delay or prevent performance, the expected duration of the delay or nature of the preventive performance, and actions which will be taken to mitigate any delay or failure to perform. Any event beyond the control of Sinclair that delays or prevents performance of Sinclair's obligations under this Consent Order constitutes a Force Majeure. Delays or failure to perform obligations caused by a Force Majeure shall not constitute violations of this Consent Order.

25. KDHE and Sinclair reserve the right to assert claims and defenses against any non-parties to this Consent Order and, without limitation, the right to seek payment, reimbursement, or contribution from non-parties to this Consent Order for actions

taken under this Consent Order.

26. Failure on the part of Sinclair to comply with any or all of the terms of this agreement, will constitute a violation of K.S.A. 65-3441. Sinclair agrees to submit payment of $500 per day in penalties for every day such a violation exists. No penalties under this section shall begin to accrue until five working days after Sinclair's default or failure to perform.

27. Subject to paragraph 28 below, Sinclair agrees to waive its right of appeal to the provisions and conditions of this Order but does retain the right to appeal KDHE disapproval of proposed work plans pursuant to the following:

> Upon receipt of the proposed workplans, KDHE shall review the plan and shall notify Sinclair of it's approval or disapproval of the plan. In the event of disapproval, KDHE shall specify in writing both the deficiencies in the plans and the reasons for disapproval. Within 30 days of receipt of notice of any disapproval, Sinclair shall amend and resubmit a revised workplan to KDHE. If KDHE refuses to approve the revised workplan, it shall specify in writing the reasons therefore. Within 10 working days of its receipt of notice of disapproval of the revised workplan, Sinclair may seek review of the disapproval pursuant to the provisions of K.S.A. 1988 Supp. 65-3440. Refusal of Sinclair to undertake any additional response actions specified in a notice of disapproval, where Sinclair has been successful upon review shall not constitute a violation of this Order. In the event that Sinclair has not been successful upon appeal or review, the assessment and apportionment of penalties shall be determined by the person who finally decides such appeal or review.

28. KDHE and Sinclair agree that paragraph 27 does not apply to the cleanup plan for the contaminated soils in the ditch. Sinclair specifically denies the findings of fact and conclusions of law as set out in this Order. A refusal by Sinclair to undertake additional response actions in regard to the ditch as specified in a notice of disapproval from KDHE shall not be a

violation of this Order.

Sinclair Oil Corporation, Inc. agrees to the terms, conditions, and requirements of this Order. The Sinclair representative hereby certifies by affixing his signature to this Order that he is authorized to sign this Order and legally bind the Sinclair Oil Corporation, Inc. to its terms, conditions, and requirements.

IT IS BY THE SECRETARY OF HEALTH AND ENVIRONMENT SO ORDERED ON THE 21st DAY OF June, 1989.

C. W. Fink — June 19, 1989
Sinclair Oil Corporation, Inc. — Date

FORM APPROVED DCS

Stanley C. Grant, Ph.D. — June 21, 1989
Secretary, Department of Health and Environment — Date

CERTIFICATE OF MAILING

I hereby certify that on the 21st day of June, 1989, a true and correct copy of the above foregoing Order was mailed to Mr. James S. Loving, General Manager, Sinclair Oil Corporation, Inc., 550 E. South Temple, P. O. Box 30825, Salt Lake City, Utah 84130-0825 by depositing the same in a properly addressed envelope, postage prepaid, certified mail, return receipt requested, in the U.S. Mail.

Staff Member

Certified Mail Nos. P 915 387 758 Sinclair Oil Corporation, Inc

MONITORING WELL DESIGN SPECIFICATIONS

A) Well Materials

The well shall be constructed of materials which are not subject to adsorption, absorption, leaching or direct attack by the suspected or known contaminants in the groundwater environment. No glue, solvents, or lubricants shall be used to construct the well. The casing shall be constructed with threaded flush joint and be at least 2 inches inside diameter. The well screen slot sizes shall be determined by a study of sieve-analysis data from samples representing the water bearing formation. The well screen shall be factory slotted. The well filter pack shall be designed so that 90 per cent of the filter pack is retained after development. The length of well screen shall be 10 feet or less to insure discrete sampling horizons.

B) Well Filter Pack and Annular Seals

The well filter pack shall be constructed of clean, inert, well rounded, organic-free material whose uniform coefficient is 2.5 or less. The filter pack shall be implaced a minimum of 1 1/2 inches on all sides of and shall extend no more than 2 feet above the well screen.

A minimum of 2 feet of certified sodium bentonite pellets shall be placed on top of the well filter pack. The pellets are to be placed so that a complete seal around the well casing may be obtained. The pellets shall be allowed to hydrate a minimum of 8 hours before further work is performed in the well.

The annular space from the top of the bentonite seal to within 1 foot beneath the frost line shall be filled with an expansive cement grout. The grout shall be placed with a tremie from the bottom of the annular area to be grouted.

The remainder of the bore hole shall be filled with a continuous pour of concrete to create a seamless concrete cap and well apron. A locking protective well casing shall be imbedded in the concrete to protect the well stick-up. The concrete apron shall be a minimum of 4 inches in thickness and 3 feet in radius. It shall be sloped to promote drainage away from the well.

Protective guards adequate to protect the well from site traffic shall be installed around the wells. A permanent survey marker shall be installed on the well for use in water level measurements. The marker shall be surveyed to within 0.1 foot horizontal and 0.01 vertical in reference to a permanent benchmark.

C. Well Development

Pumping systems which are air driven shall allow only the water which is to be expelled from the well to come into contact with the air used to operate the system. Under no circumstances will any system allow operational air to come in contact with the formation. Only formation water is to be used for development of the wells. Water and solids produced from the development of the wells shall be retained and properly disposed of.

All wells are to be developed before use as monitoring wells. Development may be accomplished by surging or vigorous pumping. Pumping systems shall be equipped with a check valve which will prevent backflow from the system into the well.

Appendix A
MONITORING WELL DESIGN SPECIFICATIONS

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The well shall be constructed of materials which are not subject to adsorption, absorption, leaching or direct attack by the suspected or known contaminants in the groundwater environment. No glue, solvents, or lubricants shall be used to construct the well. The casing shall be constructed with threaded flush joint and be at least 2 inches inside diameter. The well screen slot sizes shall be determined by a study of sieve-analysis data from samples representing the water bearing formation. The well screen shall be factory slotted. The well filter pack shall be designed so that 90 per cent of the filter pack is retained after development. The length of well screen shall be 10 feet or less to insure discrete sampling horizons.

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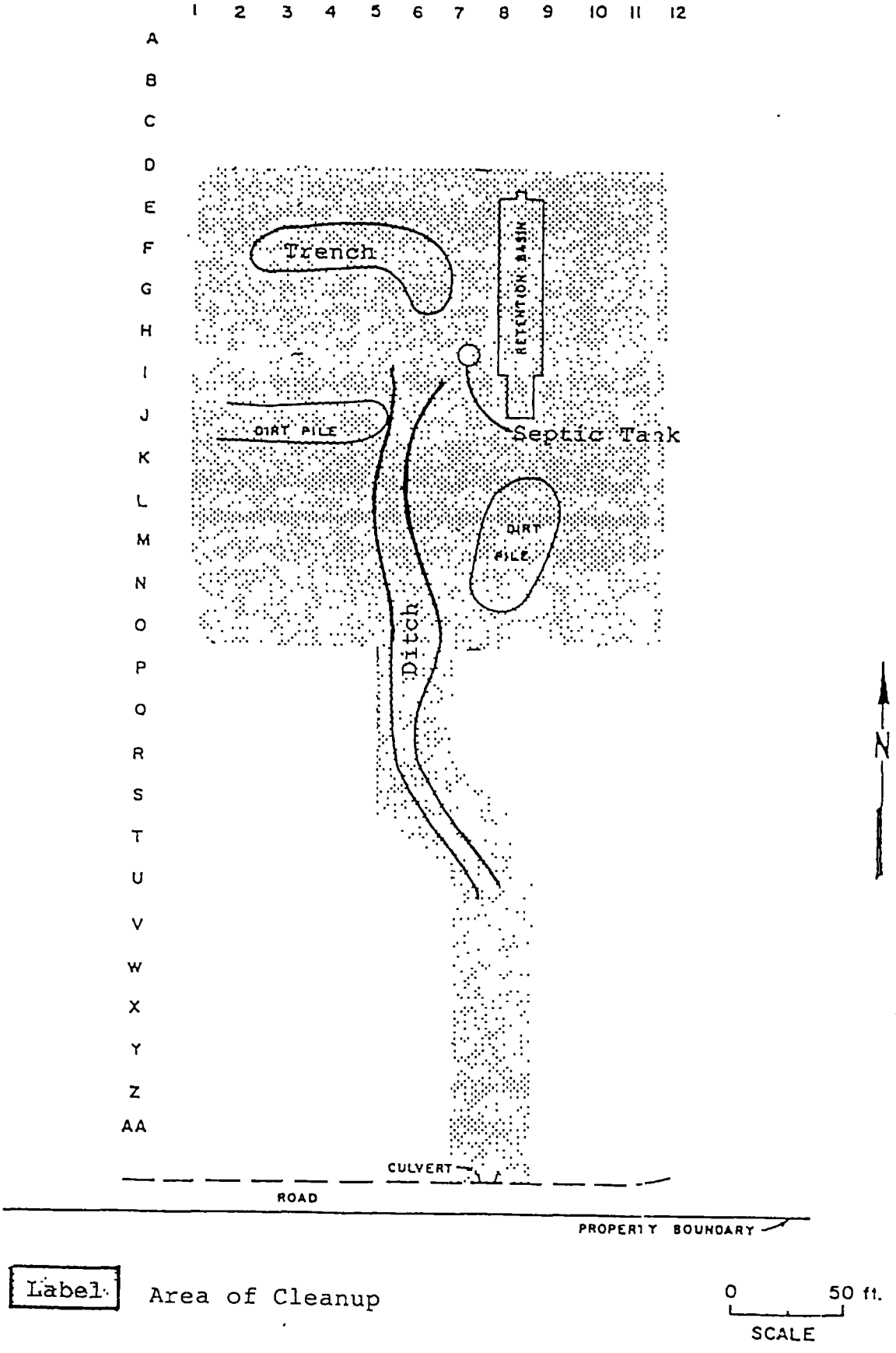
APPENDIX "B"

MAY 5, 1989



Label Area of Cleanup

0 50 ft.

SCALE

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
BUREAU OF ENVIRONMENTAL REMEDIATION

Interim Agreement to Conduct a Corrective Action Study (CAS) at the former Sinclair Refinery in Kansas City, Kansas

This Interim Agreement is between the Kansas Department of Health and Environment (KDHE), ARCO, and Sinclair Oil Corporation, wherein ARCO and Sinclair Oil Corporation agree to perform a Corrective Action Study (CAS) at the former Sinclair Refinery located at 3200 Kansas Avenue, Kansas City, Kansas.

The primary objectives of the CAS are described as follows:

1. to evaluate the feasibility, effectiveness, and cost of at least two (2) potential remedial actions based on the findings of the Phase 1 and Phase 2 Groundwater Investigation and to evaluate the "no action" alternative.

2. to recommend and justify a specific corrective action for the site.

3. to determine the health and environmental effects of the remedial action.

KDHE and ARCO and Sinclair Oil Corporation agree to the following terms:

1. ARCO and Sinclair will submit a CAS Work Plan, and an Addendum Phase 2 Work Plan to include a schedule for field activities to be conducted as a continuance of the Phase 2 investigation, to KDHE within 30 days of the signing of this agreement. The CAS Work Plan will be prepared according to the attached Scope of Work (SOW).

2. KDHE will provide comments on the Addendum Phase 2 Work Plan within 30 days following receipt of the Addendum. Upon receiving such comments, ARCO and Sinclair will meet with KDHE to discuss implementing KDHE's comments.

3. ARCO and Sinclair will begin implementation of the CAS Work Plan within 60 days of KDHE approval.

4. KDHE will proceed to review, comment on, inspect, approve or disapprove, as it deems appropriate, all work performed by ARCO and Sinclair pursuant to the approved CAS Work Plan, including all written submittals to the KDHE by ARCO and Sinclair, as well as field work performed by ARCO and Sinclair and their contractors. KDHE will not unreasonably withhold or delay approval of any such work or submittals.

5. ARCO and Sinclair will reimburse KDHE for all response, negotiation, and oversight costs incurred by KDHE in negotiating the Consent Agreement, and overseeing, inspecting, and reviewing documents and the work performed by ARCO and Sinclair hereunder. Such costs are to include safety equipment, analytical costs of samples

obtained by KDHE or split with KDHE; supplies; labor of KDHE employees (i.e., salary and fringes); costs of necessary travel of KDHE employees (mileage, lodging, food); and indirect costs at a rate of 18.3%.

6. KDHE will submit a separate billing for costs incurred to ARCO and Sinclair Oil Corporation beginning six months after the signing of this agreement, and every six months thereafter for the duration of this agreement. KDHE agrees to submit a billing for one half the costs to ARCO and one half the costs to Sinclair Oil Corporation.

7. Within 30 days of the receipt of these billings, ARCO and Sinclair shall submit checks for the costs specified in above paragraphs 5. and 6., made payable to KDHE, to the following address:

Remedial Section
Bureau of Environmental Remediation
Kansas Department of Health and Environment
Forbes Field, Building 740
Topeka, Kansas 66620-0001

8. The parties will jointly endeavor in good faith to negotiate a Consent Agreement for the completion of a Corrective Action Plan/ Corrective Action (CAP/CA) which will follow the completion of the CAS. In the event that a joint Consent Agreement should not or cannot be negotiated, the parties agree to promptly negotiate separate Consent Agreements with KDHE (one between ARCO and KDHE, and one between Sinclair and KDHE).

9. This interim agreement will remain effective until such time as both the CAS Report is approved by KDHE and the Consent Agreement or Agreements for the CAP/CA has been signed by all parties.

10. ARCO and Sinclair Oil Corporation will designate project managers to serve as single points of contact for all work associated with this interim agreement and subsequent Consent Agreement.

11. Nothing in this interim agreement shall be considered an admission of any fact or an acknowledgment of any liability by ARCO and Sinclair Oil Corporation; and, nothing herein shall be binding on or have any effect on the position of the parties on any matter, including cleanup levels, that may be included in any Consent Agreement or other agreements to be negotiated between them.

12. If the foregoing provisions are agreeable to ARCO and Sinclair Oil Corporation as an interim measure to allow us to proceed, please have the appropriate representatives

SCOPE OF WORK (SOW)
for a
CORRECTIVE ACTION STUDY (CAS)

This Scope of Work outlines the activities to be completed as part of the Corrective Action Study (CAS). A work plan that describes in detail the CAS activities shall be developed and submitted to KDHE for review and approval. In addition, the work plan must include the following appendices: (1) quality assurance project plan; and (2) health and safety plan.

The primary objectives of the CAS are described as follows:

1. to evaluate the feasibility, effectiveness, and cost of at least two (2) potential remedial actions based on the findings of the CI and to evaluate the "no action" alternative.

2. to recommend and justify a specific corrective action for the site..

3. to determine the health and environmental effects of the remedial action.

The Scope of Work shall at a minimum include the following components:

1.0 Summary of Previous Study Area Investigation(s) and Activities

A description of the physical characteristics of the study area including, but not limited to, geology, soils, hydrogeology, surface water hydrology, land use, and meteorology.

2.0 Summary of Previous Study Results and Conclusions

A detailed description of the field activities used to determine and describe the source(s) and release characteristics. This may include several components: (1) review of facility records; (2) waste and/or soil sampling; (3) equipment testing (i.e., tank testing, pipeline testing, etc.); (4) aerial photograph review; and (5) land elevation surveys.

3.0 Nature and Extent Characterization

The CAS shall evaluate the necessity for any further study to determine the horizontal and vertical extent of contamination in soil, groundwater, surface water, sediment, air, and biota; and in evaluation of transport pathways. The CAS shall propose further investigation (if necessary) which may include several components: (1) hydrogeologic investigation; (2) soil investigation; (3) surface water and sediment investigation; (4) air investigation; and (5) biota investigation.

4.0 Identification of Corrective Action Alternatives

Previous investigation data as described in number 1. and 2. above should be used to develop an initial list of corrective action alternatives that will be evaluated during the Corrective Action Study (CAS). Selection of at least two alternatives to be further evaluated during the CAS and the no action alternative should be identified in the report.

5.0 Evaluation of Corrective Actions

Evaluate at least two possible corrective actions and a "no action" alternative for the site. The corrective actions and the no action alternative shall address potential threats to human health and the environment.

The evaluation shall include: (1) a description of the contaminants of concern; (2) an evaluation of the possible exposure route(s); (3) the corrective action goals; (4) consideration of the nature and extent of contamination as defined by the CAS or other KDHE approved investigation documents; (5) an evaluation of the effectiveness of the corrective action in terms of the corrective action goals; and (6) a comparison of the costs of each corrective action.

Identify and implement necessary treatability studies for corrective actions considered "unproven" (e.g., a new technology or one that is dependent on site characteristics) or to obtain site-specific information to evaluate the success of the corrective action.

6.0 Recommend a corrective action

The evaluation of correction actions shall determine a recommended corrective action for the site which satisfies the requirements for protection of human health and the environment and satisfies the applicable State laws and standards.

7.0 CAS Report

The CAS Report shall include: (1) a description of the evaluation of at least two possible corrective actions and a "no action" alternative for the site which addresses the points in paragraph 5.0 above; (2) a description of the recommended corrective action described in paragraph 6.0 above; (3) a description of any investigations conducted during the CAS; and (4) an Appendix containing any background information or literature which was used to evaluate each corrective action.

of ARCO and Sinclair Oil Corporation so indicate by signing the duplicate original of this interim agreement

Agreed to for and on behalf of
Atlantic Richfield Company

By: C.R. Knowles
Name: C. R. KNOWLES
Title: MANAGER
Date: 7-30-93

Agreed to for and on behalf of
Sinclair Oil Corporation

By: Klane F Fosgren
Name: KLANE F FOSGREN
Title: MANAGER
Date: 8/3/93

Agreed to for and on behalf of
Kansas Department of Health and Environment

By: Charles F. Jones
Name: Charles F. Jones
Title: Director, Division of Environment
Date: August 9, 1993